CLAIMS

1. A solid electrolytic capacitor comprising:

a capacitor element including

an anode body made of valve metal having a rough surface,

a dielectric oxide layer provided on the surface of the anode body,

a resist having an insulating property provided on the dielectric oxide layer, the resist dividing the anode body and the dielectric oxide layer into a cathode portion and an anode portion,

a solid electrolyte layer made of conductive polymer provided on the dielectric layer at the cathode portion, and

a cathode layer provided on the solid electrolyte layer;

an anode terminal having a flat plate shape having a first surface and a second surface opposite to the first surface of the anode terminal, the first surface of the anode terminal being connected to the anode portion;

a cathode terminal having a flat plate shape having a first surface and a second surface opposite to the first surface of the cathode terminal, the first surface of the cathode terminal being connected to the cathode layer, the second surface of the cathode terminal being flush with the second surface of the anode terminal; and

a resin package having an insulating property for accommodating the capacitor element, the anode terminal, and the cathode terminal, the resin package allowing the second surface of the anode terminal and the second surface of the cathode terminal to expose to an outside of the resin package,

wherein the anode terminal includes a first thick portion and a first thin portion thinner than the first thick portion, the first thick portion

having the second surface of the anode terminal and a portion of the first surface of the anode terminal, the first thin portion having a portion of the first surface of the anode terminal and being connected to the first thick portion, and

wherein the cathode terminal includes a second thick portion and a second thin portion thinner than the second thick portion, the second thick portion having the second surface of the cathode terminal and a portion of the first surface of the cathode terminal, the second thin portion having a portion of the first surface and being connected to the second thick portion.

2. The solid electrolytic capacitor of claim 1, further comprising:

another capacitor element stacked on the capacitor element, the another capacitor element including another anode portion and another cathode layer;

an anode lead frame for joining the anode portion of the capacitor element with the another anode portion of the another capacitor element, the anode lead frame being connected to the first surface of the anode terminal; and

a cathode lead frame for joining the cathode layer of the capacitor element with the another cathode layer of the another capacitor element, the cathode lead frame being connected to the first surface of the cathode terminal.

3. The solid electrolytic capacitor of claim 2, wherein the anode lead frame is connected to the anode terminal at the first thin portion.

4. The solid electrolytic capacitor of claim 2, wherein the cathode lead frame is connected to the cathode terminal at the second thin portion.

5. The solid electrolytic capacitor of claim 2, wherein the cathode lead frame includes a guide for positioning the capacitor element and the another capacitor element.

6. The solid electrolytic capacitor of claim 1, wherein a difference between respective thicknesses of the first thick portion and the first thin portion of the anode terminal is not less than 80μm.

7. The solid electrolytic capacitor of claim 1, wherein a difference between respective thicknesses of the second thick portion and the second thin portion of the cathode terminal is not less than 80μm.

8. The solid electrolytic capacitor of claim 1, wherein the anode terminal and the cathode terminal are made of a metal plate etched.

9. The solid electrolytic capacitor of claim 1, wherein the valve metal comprises one selected from the group consisting of aluminum, tantalum, niobium, and combination thereof.

10. The solid electrolytic capacitor of claim 1, wherein a distance between the cathode terminal and the anode terminal is not less than 1mm.

11. The solid electrolytic capacitor of claim 10, wherein the distance between the cathode terminal and the anode terminal is 1mm.

12. The solid electrolytic capacitor of claim 1, wherein the second surface of the cathode terminal and the second surface of the anode terminal

are arranged to be mounted on a mount body.

13. The solid electrolytic capacitor of claim 1, wherein the anode terminal includes a protruding portion protruding from the resin package, and the protruding portion has a portion of the second surface of the anode terminal.

14. The solid electrolytic capacitor of claim 13, wherein the protruding portion of the anode terminal extends along an exterior surface of the resin package.

15. The solid electrolytic capacitor of claim 1, wherein the cathode terminal includes a protruding portion protruding from the resin package, and the protruding portion has a portion of the second surface of the cathode terminal.

16. The solid electrolytic capacitor of claim 15, wherein the protruding portion of the cathode terminal extends along an exterior surface of the resin package.

17. The solid electrolytic capacitor of claim 1,

wherein the cathode terminal further includes a third thin portion thinner than the second thick portion, the third thin portion having a portion of the first surface of the cathode terminal and being connected to the second thick portion,

wherein the anode terminal and the cathode terminal are arranged in a first direction, and

wherein the second thick portion is provided between the second

thin portion and the third thin portion of the cathode terminal, so that the second thin portion, the third thin portion, and the second thick portion are arranged in a second direction perpendicular to the first direction.

18. The solid electrolytic capacitor of claim 17, wherein a difference between respective thicknesses of the second thick portion and the third thin portion of the cathode terminal is not less than 80μm.

19. The solid electrolytic capacitor of claim 1,

wherein the anode terminal further includes a third thin portion thinner than the first thick portion, the third thin portion having a portion of the first surface of the anode terminal and being connected to the first thick portion,

wherein the anode terminal and the cathode terminal are arranged in a first direction, and

wherein the first thick portion is provided between the first thin portion and the third thin portion of the anode terminal, so that the first thin portion, the third thin portion, and the first thick portion are arranged in a second direction perpendicular to the first direction.

20. The solid electrolytic capacitor of claim 19, wherein a difference between respective thicknesses of the first thick portion and the third thin portion of the anode terminal is not less than 80μm.

21. The solid electrolytic capacitor of claim 1,

wherein the second thick portion of the cathode terminal faces the anode terminal, and

wherein the second thin portion of the cathode terminal extends

from the second thick portion in a direction opposite to the anode terminal.

22. The solid electrolytic capacitor of claim 1, wherein the cathode terminal further includes a mounting portion provided at an end of the second thin portion opposite to the second thick portion, the mounting portion having a surface being flush with the second surface of the cathode terminal.

23. The solid electrolytic capacitor of claim 1,

wherein the anode terminal and the cathode terminal are arranged in a first direction, and

wherein the second thick portion of the cathode terminal having substantially a "T" shape, and the second thick portion includes

a first portion facing the anode terminal, and

a second portion extending from the first portion in a direction opposite to the anode terminal, the second portion having a width narrower than a width of the first portion.

24. The solid electrolytic capacitor of claim 23,

wherein the cathode terminal further includes a third thin portion thinner than the second thick portion, the third thin portion having a portion of the first surface of the cathode terminal and being connected to the second thick portion, and

wherein the second thick portion of the cathode terminal is provided between the second thin portion and the third thin portion, so that the second thin portion, the third thin portion, and the second portion of the second thick portion are arranged in a second direction perpendicular to the first direction.

25. The solid electrolytic capacitor of claim 23, wherein the cathode terminal further includes a protruding portion extending from the first portion of the second thick portion and protruding from the resin package, the protruding portion having a portion of the second surface of the cathode terminal

26. The solid electrolytic capacitor of claim 25, wherein the protruding portion of the cathode terminal extends along an exterior surface of the resin package.

27. The solid electrolytic capacitor of claim 26, wherein the resin package has a recess therein in which the protruding portion of the cathode terminal is positioned.

28. The solid electrolytic capacitor of claim 23, wherein the cathode terminal further includes a protruding portion extending from the second portion of the second thick portion and protruding from the resin package, the protruding portion having the second surface of the cathode terminal.

29. The solid electrolytic capacitor of claim 28, wherein the protruding portion of the cathode terminal extends along an exterior surface of the resin package.

30. The solid electrolytic capacitor of claim 29, wherein the resin package has a recess therein in which the protruding portion of the cathode terminal is positioned.

31. A method of manufacturing a solid electrolytic capacitor, comprising:

providing a capacitor element which includes

an anode body made of valve metal having a rough surface,

a dielectric oxide layer provided on the surface of the anode body,

a resist having an insulating property provided on the dielectric oxide layer, the resist dividing the anode body and the dielectric oxide layer into a cathode portion and an anode portion,

a solid electrolyte layer made of conductive polymer provided on the dielectric oxide layer at the cathode portion, and

a cathode layer provided on the solid electrolyte layer;

joining the anode portion of the capacitor element to an anode lead frame;

joining the cathode layer of the capacitor element to a cathode lead frame;

providing an anode terminal having a flat plate shape having a first surface and a second surface opposite to the first surface of the anode terminal, the anode terminal including a first thick portion and a first thin portion thinner than the first thick portion, the first thick portion having the second surface of the anode terminal and a portion of the first surface of the anode terminal, the first thin portion having a portion of the first surface and being connected to the first thick portion;

providing a cathode terminal having a flat plate shape having a first surface and a second surface opposite to the first surface of the cathode terminal, the second surface of the cathode terminal being flush with the second surface of the anode terminal, the cathode terminal including a

second thick portion and a second thin portion thinner than the second thick portion, the second thick portion having the second surface of the cathode terminal and a portion of the first surface of the cathode terminal, the second thin portion having a portion of the first surface and being connected to the second thick portion;

joining the anode lead frame onto the first surface of the anode terminal;

joining the cathode lead frame onto the first surface of the cathode terminal; and

accommodating the capacitor element, the anode terminal, the cathode terminal, the anode lead frame, and the cathode lead frame in a resin package having an insulating property, the second surface of the anode terminal and the second surface of the cathode terminal exposing to an outside of the resin package.

32. The method of claim 31, further comprising:

providing another capacitor element including another anode portion and another cathode layer; and

stacking the another capacitor element on the capacitor element,

wherein said joining the anode portion of the capacitor element to the anode lead frame comprises joining the anode portion of the capacitor element and the another anode portion of the another capacitor element unitarily to the anode lead frame, and

wherein said joining the cathode layer of the capacitor element to the cathode lead frame comprises joining the cathode layer of the capacitor element and the another cathode layer of the another capacitor element unitarily to the cathode lead frame.

33. The method of claim 31, further comprising

forming a substrate having the anode terminal and the cathode terminal by etching a metal plate,

wherein said providing the anode terminal comprises removing the anode terminal from the substrate, and

wherein said providing the cathode terminal comprises removing the cathode terminal from the substrate.

34. The method of claim 31, wherein said joining the anode lead frame onto the first surface of the anode terminal comprises joining the anode lead frame to the first thin portion of the anode terminal.

35. The method of claim 31, wherein said joining the cathode lead frame onto the first surface of the cathode terminal comprises joining the cathode lead frame to the second thin portion of the cathode terminal.

36. The method of claim 31, wherein said accommodating the capacitor element, the anode terminal, the cathode terminal, the anode lead frame, and the cathode lead frame in the resin package comprises accommodating the capacitor element, the anode terminal, the cathode terminal, the anode lead frame, and the cathode lead frame in the resin package to allow the first thick portion of the anode terminal to have a protruding portion protruding from the resin package, said method further comprising

bending the protruding portion of the anode terminal along an exterior surface of the resin package.

37. The method of claim 36, further comprising

providing a recess in the resin package,

wherein said bending the protruding portion of the anode terminal along the exterior surface of the resin package comprises positioning the protruding portion in the recess of the resin package.

38. The method of claim 31, wherein said accommodating the capacitor element, the anode terminal, the cathode terminal, the anode lead frame, and the cathode lead frame in the resin package comprises accommodating the capacitor element, the anode terminal, the cathode terminal, the anode lead frame, and the cathode lead frame in the resin package to allow the second thick portion of the cathode terminal to have a protruding portion protruding from the resin package, said method further comprising

bending the protruding portion of the cathode terminal along an exterior surface of the resin package.

39. The method of claim 38, further comprising

providing a recess in the resin package,

wherein said bending the protruding portion of the cathode terminal along the exterior surface of the resin package comprises positioning the protruding portion in the recess of the resin package.